

**DRAFT**  
**Transamerica Pyramid Properties, LLC**  
**Application #14924; Plant #17925**

**BACKGROUND:**

Transamerica Pyramid Properties has applied for an Authority to Construct and Permit to Operate the following sources:

**S-1: Natural Gas-fired Rich Burn Engine, Waukesha Model VGF L36GSID, 800 Bhp, Abated by A-1, Miratech 3-way Catalyst with an Air/Fuel Ratio Controller, to Power a 500kW Generator for a Cogeneration Plant.**

**S-2: Natural Gas-fired Rich Burn Engine, Waukesha Model VGF L36GSID, 800 Bhp, Abated by A-2, Miratech 3-way Catalyst with an Air/Fuel Ratio Controller, to Power a 500kW Generator for a Cogeneration Plant.**

The proposed engines are for a co-generation plant to be located at 600 Montgomery Street, San Francisco, CA 94111. Two natural gas fired 800 Bhp rich burn engines drive two 500 kW generators to produce electricity. Two-3-way, non-selective catalytic reduction (NSCR), units, designated as A-1 and A-2, with air/fuel ratio controllers, abate the emissions from engines S-1 and S-2, respectively.

**EMISSION CALCULATIONS:**

Basis:

1. Each engine has a capacity of 6.69 MM Btu/hr, 800 Bhp/hr. Natural gas firing only.
2. Each engine can operate up to 24 hours a day and 365 days per year (8760 hours per year)
3. Each engine's NO<sub>x</sub>, CO, and POC emissions will be calculated based on meeting BACT
4. PM<sub>10</sub> calculations will be based on EPA AP-42 for 4-stroke rich burn engines (Table 3.2-3) 0.0194 lb/MMBtu
5. SO<sub>2</sub> calculations will be based on the sulfur content of PG&E utility natural gas: 0.318 g S/100 scf or 0.00089 lb/MMBtu

<u>Pollutant</u>	<u>Emission Factor</u> <u>(g/Bhp-hr)</u>	<u>Emissions (per retort)</u>		<u>Cumulative Plant Emissions</u> <u>(Tons/yr for both-engines)</u>
		<u>lbs/day</u>	<u>Tons/yr.</u>	
NO <sub>x</sub>	0.15 <sup>a</sup>	6.35	1.16	2.32
CO	0.60 <sup>b</sup>	25.4	4.63	9.27
POC	0.15 <sup>c</sup>	6.35	1.16	2.32
	<u>(Lb/MMBtu)</u>			
PM <sub>10</sub>	0.0194	3.11	0.57	1.14
SO <sub>2</sub>	0.00089	0.14	0.026	0.052

- a. 9 ppmvd @ 15% oxygen
- b. 56 ppmvd @ 15% oxygen
- c. 25 ppmvd @ 15% oxygen

### Emissions Toxic Air Contaminants (TAC):

The TAC emission factors and calculated emissions are listed below. The TAC emission rates are calculated based on the emission factors listed in Air Resources Board California Air Toxic Emission Factor (CATEF) database for 4 stroke rich burn engines.

#### **Basis:**

Natural gas usage = 57.6 E6 ft<sup>3</sup>/year/Engine

Number of hours of operation = 8760 hours/yr/Engine

#### **TAC Emission Factors and Emissions per Engine:**

<b>Compound</b>	<b>Emission Factor (lb/10<sup>6</sup>ft<sup>3</sup> natural gas)</b>	<b>Emission Rate (lb/yr)</b>
1,3 Butadiene	1.04 E-1	6.000
Acenaphthene	1.94 E-3	0.110
Acenaphthalene	1.45 E-2	0.840
Acetaldehyde	8.83 E-1	50.900
Acrolein	5.47 E-1	31.500
Anthracene	1.84 E-3	0.110
Benzene	7.39 E-2	4.300
Benzo(a)anthracene	2.94 E-4	0.017
Benzene(a)pyrene	1.15 E-4	0.007
Benzo(b)fluranthene	1.03 E-4	0.014
Benzo(g,h,i)perylene	1.95 E-4	0.011
Benzo(k)fluranthene	1.03 E-4	0.006
Chrysene	3.10 E-4	0.018
Dibenzo(a,h)anthracene	1.25 E-5	0.001
Ethylbenzene	1.16 E-2	0.670
Fluoranthene	9.95 E-4	0.057
Fluorene	6.91 E-3	0.400
Formaldehyde	1.40 E-1	8.060
Indeno(1,2,3-cd)pyrene	1.69 E-4	0.010
Naphthalene	7.65 E-2	4.410
Phenanthrene	7.07 E-3	0.410
Propylene	1.60 E01	922.000
Pyrene	1.79 E-3	0.100
Toluene	1.07 E00	0.001
Xylene	6.02 E-2	35.000

#### **RISK SCREEN ANALYSIS:**

This application requires a health risk screen analysis because one or more toxic air contaminant exceed its respective trigger per Regulations 2-5-110 and 2-5-401. Thus a public notification will be required also for the project because of the proximity of nearby schools. Based on the

attached health risk screening analysis performed by the District Toxic Section, the project cancer risk, non-cancer hazard index and maximum acute non-cancer hazard index are summarized in the following table for nearby residents, workers and students. The project cancer risk is less than 10 in a million, the non-cancer chronic hazard index is less than 0.2, and the acute hazard index is below 1.0. Thus in accordance with Regulation 2-5, the project risk level is considered acceptable.

<b>Receptor</b>	<b>Cancer Risk</b>	<b>Non-cancer hazard Index</b>	<b>Max. Acute Non-cancer Hazard Index</b>
Resident	8 in a million	0.040	0.0020
Worker	4 in a million	0.020	0.0040
Student (Nam Kue School)	0.09 in a million	0.002	0.0004
Student (Chinese Education School)	0.03 in a million	0.001	0.0001
Student (John Chin School)	0.04 in a million	0.001	0.0002

**PUBLIC NOTIFICATION (WATERS BILL) Regulation 2-1-412:**

The following three schools are within 1000 feet of the sources:

- Chinese Education Elementary School, 657 Merchant Street, San Francisco, CA
- John Yehall Chin Elementary School, 350 Broadway, San Francisco, CA
- Nam Kue School, 755 Sacramento Street, San Francisco, CA

In accordance with the Waters Bill, a public notification is required if there is any school within 1000 feet of a proposed project that has the potential to increase any toxic air contaminant emissions. The parents or guardians of children enrolled in any school within one-quarter mile of the project and other residents within 1000 feet will be notified and provided a 30-day period to comment on the project. Comments from the public will be responded to and addressed by the District engineer.

**BACT DETERMINATION:**

The engines S-1 and S-2 each trigger Best Available Control Technology requirement of Regulation 2-2-301 since uncontrolled NOx, CO and POC emissions can each exceed 10 lb/day. Each engine will be equipped with a 3- way non-selective catalytic reduction (NSCR) unit that can meet the following BACT 2 limits.

<u>Pollutant</u>	<u>g/Bhp-hr</u>
NO <sub>x</sub>	0.15
CO	0.60
POC	0.15

As shown previously, controlled NO<sub>x</sub> and POC emission will be under 10 lb/day and CO will meet the achieved in practice BACT level, thus complying with Regulation 2-2-301. BACT for PM<sub>10</sub> and SO<sub>2</sub> is use of natural gas and good combustion practice.

#### **OFFSET REQUIREMENT:**

The application does not require offsets because the plant Cumulative Increases of NO<sub>x</sub> and POC are each less than 10 tons per year in accordance with Regulation 2-2-302

#### **COMPLIANCE DETERMINATION:**

##### **Sources S-1 and S-2:**

The proposed engines are expected to operate in compliance with Regulation 6-301 (Ringelman No. 1 Limitation), Regulation 9-8-301.1 (56 ppmvd NO<sub>x</sub> @ 15% O<sub>2</sub>) and Regulation 9-8-301.3 (2000 ppmvd CO @ 15% O<sub>2</sub>).

The sources are subject to the NSR rule Regulation 2-2. The BACT requirements are met and the details are in the BACT determination section of this report. Offsets are not required.

The sources are located within 1000 feet of schools. The necessary risk screening analysis and public notification in accordance with the Waters Bill have been performed.

PSD, NSPS and NESHAPS requirements are not triggered

The project is considered ministerial. The Planning Department of the City of San Francisco has filed a categorical exemption from CEQA for this project, dated May 22, 2006.

#### **CONDITIONS:**

These conditions are applicable to the following sources covered by this application:

**S-1: Natural Gas-fired Rich Burn Engine, Waukesha Model VGF L36GSID, 800 Bhp, Abated by A-1, Miratech 3-way Catalyst with an Air/Fuel Ratio Controller, to Power a 500 kW Generator for a Cogeneration Plant.**

**S-2: Natural Gas-fired Rich Burn Engine, Waukesha Model VGF L36GSID, 800 Bhp, Abated by A-2, Miratech 3-way Catalyst with an Air/Fuel Ratio Controller, to Power a 500 kW Generator for a Cogeneration Plant.**

1. The natural gas-fired rich burn internal combustion engines, S-1 and S-2, shall be fired exclusively on natural gas. [Basis: Cumulative Increase, BACT]

2. The total usage of natural gas at each engine, S-1 or S-2, shall not exceed 57.6 million standard cubic feet during any consecutive 12-month period. (Basis: Cumulative Increase, Regulation 2-5)
3. A District approved non-resettable, totalizing fuel meter for measuring natural gas consumption shall be installed at each engine, S-1 and S-2, prior to any operation and maintained in good working order. [Basis: Cumulative Increase, BACT, Regulation 2-5]
4. During operation, S-1 and S-2 shall always be abated by the properly operated and maintained A-1 and A-2, Miratech 3-way catalysts with air/fuel controllers, respectively. [Basis: Cumulative Increase, BACT, Regulation 2-5]
5. For each engine, S-1 and S-2, NO<sub>x</sub> emissions, calculated as NO<sub>2</sub>, at the outlets of A-1 and A-2, respectively, shall not exceed 9 ppmvd @ 15% O<sub>2</sub> . [Basis: Cumulative Increase, BACT]
6. For each engine, S-1 and S-2, CO emissions at the outlets of A-1 and A-2, respectively, shall not exceed 56 ppmvd @15% oxygen. [Basis: Cumulative Increase and BACT]
7. For each engine, S-1 and S-2, POC emissions at the outlets of A-1 and A-2, respectively, shall not shall not exceed 25 ppmvd @15% oxygen [Basis: Cumulative Increase]
8. The owner/operator shall not allow cumulative combined emissions from engines S-1 and S-2 at the outlets of A-1 and A-2, respectively, to exceed the following limits during any consecutive 12-month period:
  - a. 2.32 ton/yr of NO<sub>x</sub>
  - b. 9.27 ton/yr of CO
  - c. 2.32 ton/yr of POC[Basis: Cumulative Increase, Offsets]
9. In order to demonstrate compliance with Parts 5, 6, 7, and 8 the owner operator shall conduct a District approved source test on each engine within 90 days of its respective start-up. These source tests shall be performed bi-annually thereafter for each engine. The Source Test section of the District shall be contacted to obtain their prior approval of the source test procedures and shall be notified 7 days in advance of each source test. The source test report shall be submitted to the District within 45 days of the test date.[Basis: Cumulative Increase, BACT]
10. During the period of time between the annual source tests required in Part 9 for each engine, S-1 and S-2, the owner/operator shall demonstrate compliance with Parts 5, 6 and 7 by measuring NO<sub>x</sub>, CO, and POC emissions quarterly using District approved portable gas analyzers. [Basis: Cumulative Increase, BACT]
11. For each engine, S-1 and S-2, monthly records of natural gas consumption and quarterly measurements of NO<sub>x</sub> and CO shall be maintained in a District approved logbook. All

records, including source test reports, shall be retained on site for at least two years from the date of entry, and made available for inspection by District staff upon request. These record-keeping requirements shall not replace the record-keeping requirements contained in any applicable District regulations.

Hari Doss  
Air Quality Engineer II

Date: 10/18/06